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EXAMINER	
ARNOLD JR, JAMES	

ART UNIT	PAPER NUMBER
1764	6

DATE MAILED: 06/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/083,934	Applicant(s) PORTER ET AL.	
	Examiner James Arnold, Jr.	Art Unit 1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-86* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-86* is/are rejected.

7)☒ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2,3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 11-12, 21-22, 58, 61, 64, 76-77 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Vebeliunas (USPN 6,107,533).

The Vebeliunas reference discloses separating said cracked gas stream in a deethanizer zone to produce a C2- stream and a C3+ stream; hydrogenating said C2- stream in a hydrogenation zone to remove a portion of the acetylene to produce a dilute ethylene stream; separating said C3+ stream in a depropanizer zone to produce a C3- stream and a C4+ stream; routing said C3+ stream to a storage or other process unit and reacting a C3- stream in a MAPD reactor zone to convert a portion of methylacetylene and propadiene to propylene and propane to produce a dilute propylene stream. See Column 2, lines 20-67; Column 3, lines 1-35; Column 3, lines 64-68; and Column 4, lines 1-2 and lines 42-56. The reference discloses a process further comprising separating a C4+ stream in a debutanizer zone to produce a C4 stream and a C5+ stream. See Column 2, lines 35-40. The reference discloses compressing a C2- stream in a compression zone to form a pressurized C2- stream. Column 6, lines 49-65. The reference discloses hydrogenating a portion of the acetylene in the cracked gas stream in hydrogenation zone to produce a reduced acetylene cracked gas stream and separating said reduced acetylene

cracked gas stream in a deethanizer zone to produce said dilute ethylene stream and a C3+ stream. See Column 3, lines 64-68 and Column 4, lines 1-2 and lines 42-56.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 3-6, 13-16, 23-26, and 78-81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Rao (WO 01/64340 A1).

The Rao reference discloses the formation of olefin derivatives from recovered olefins including ethylene and propylene. See Page 14, line 29. These derivatives include ethylbenzene, cumene, acrylic acid, and propylene oxide. See Page 15, lines 20-27.

The Rao reference does not disclose a dilute ethylene and propylene derivative unit.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to include the olefin derivates of Rao

and the olefin derivative units because both references disclose processes of producing olefins and an olefin derivative unit is the means through which an olefin derivative is produced.

Claims 7,17, 27, and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Owen et al. (USPN 6,258,989).

The Owen reference discloses a process comprising treating said C5+ stream in a hydrotreating zone to produce a C5 diolefins stream, a BTX stream, and a DCPD stream. See Column 13, lines 30-36.

The reference does not disclose a process comprising treating said C5+ stream in a hydrotreating zone to produce a fuel oil stream.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to utilize a process comprising treating said C5+ stream in a hydrotreating zone to produce a C5 diolefins stream, a BTX stream, and a DCPD stream and furthermore produce a fuel oil stream because both references disclose the upgrading of hydrocarbons and because fuel oil is a product of hydrotreating.

Claims 8-10, 18-20, and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533).

The Vebeliunas reference discloses steam cracking for gas streams with diverse constituents. See Column 1, lines 18-25. The reference discloses quenching, compressing, and deacidifying cracked gas streams. See Column 1, lines 59-67 and Column 6, lines 49-65. The reference discloses a process wherein the hydrocarbon feed is selected from the group consisting of ethane, propane, butanes, pentanes, naphtha, and mixtures thereof. See Column 1, lines 59-67 and Column 6, lines 49-55.

The reference does not disclose a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents. The reference does not disclose removing a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream. The reference does not disclose a process wherein the hydrocarbon feed consists essentially of C5 hydrocarbons.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents because the reference discloses steam cracking for gas streams with diverse constituents. It would have been obvious to one having ordinary skill in the art at the time the invention was made to remove a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream because this places the cracked gas stream in condition to be used for the production of an olefin stream. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the hydrocarbon feed consists essentially of C5 hydrocarbons because the reference discloses steam cracking for gas streams with diverse constituents.

Claims 31-32 and 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533).

The Vebeliunas reference discloses steam cracking for gas streams with diverse constituents. See Column 1, lines 18-25. The reference discloses quenching, compressing, and deacidifying cracked gas streams. See Column 1, lines 59-67 and Column 6, lines 49-65. The

reference discloses a process wherein the hydrocarbon feed is selected from the group consisting of ethane, propane, butanes, pentanes, naphtha, and mixtures thereof. See Column 1, lines 59-67 and Column 6, lines 49-55. The Vebeliunas reference discloses separating said cracked gas stream in a deethanizer zone to produce a C2- stream and a C3+ stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses hydrogenating said pressurized C2- stream in a hydrogenation zone to remove a portion of the acetylene to produce a dilute ethylene stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses separating said C3+ stream in a depropanizer zone to produce a C3- stream and a C4+ stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses reacting a C3- stream in a MAPD reactor zone to convert a portion of methylacetylene and propadiene to propylene and propane to produce a dilute propylene stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses a process further comprising separating a C4+ stream in a debutanizer zone to produce a C4 stream and a C5+ stream. See Column 2, lines 35-40. The reference discloses a process wherein the hydrocarbon feed is selected from the group consisting of ethane, propane, butanes, pentanes, naphtha, and mixtures thereof. See Column 1, lines 59-67 and Column 6, lines 49-55.

The reference does not disclose a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents. The reference does not disclose removing a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream. The reference does not disclose a process wherein the hydrocarbon feed consists essentially of C5

hydrocarbons. The reference does not disclose compressing said C2- stream in a second compression zone to form a pressurized C2- stream.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents because the reference discloses steam cracking for gas streams with diverse constituents. It would have been obvious to one having ordinary skill in the art at the time the invention was made to remove a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream because this places the cracked gas stream in condition to be used for the production of an olefin stream. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the hydrocarbon feed consists essentially of C5 hydrocarbons because the reference discloses steam cracking for gas streams with diverse constituents. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein said C2- stream is compressed in a second compression zone to form a pressurized C2- stream because the reference discloses the use of a compressor.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Owen et al. (USPN 6,258,989).

The Owen reference discloses a process comprising treating said C5+ stream in a hydrotreating zone to produce a C5 diolefins stream, a BTX stream, and a DCPD stream. See Column 13, lines 30-36.

The reference does not disclose a process comprising treating said C5+ stream in a hydrotreating zone to produce a fuel oil stream.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to utilize a process comprising treating said C5+ stream in a hydrotreating zone to produce a C5 diolefins stream, a BTX stream, and a DCPD stream and furthermore produce a fuel oil stream because both references disclose the upgrading of hydrocarbons and because fuel oil is a product of hydrotreating.

Claims 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Rao (WO 01/64340 A1).

The Rao reference discloses the formation of olefin derivatives from recovered olefins including ethylene and propylene. See Page 14, line 29. These derivatives include ethylbenzene, cumene, acrylic acid, and propylene oxide. See Page 15, lines 20-27.

The Rao reference does not disclose a dilute ethylene and propylene derivative unit.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to include the olefin derivates of Rao and the olefin derivative units because both references disclose processes of producing olefins and an olefin derivative unit is the means through which an olefin derivative is produced.

Claims 40-41 and 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533).

The Vebeliunas reference discloses steam cracking for gas streams with diverse constituents. See Column 1, lines 18-25. The reference discloses quenching, compressing, and deacidifying cracked gas streams. See Column 1, lines 59-67 and Column 6, lines 49-65. The

reference discloses a process wherein the hydrocarbon feed is selected from the group consisting of ethane, propane, butanes, pentanes, naphtha, and mixtures thereof. See Column 1, lines 59-67 and Column 6, lines 49-55. The Vebeliunas reference discloses separating said cracked gas stream in a deethanizer zone to produce a C2- stream and a C3+ stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses hydrogenating said pressurized C2- stream in a hydrogenation zone to remove a portion of the acetylene to produce a dilute ethylene stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses separating said C3+ stream in a depropanizer zone to produce a C3- stream and a C4+ stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses reacting a C3- stream in a MAPD reactor zone to convert a portion of methylacetylene and propadiene to propylene and propane to produce a dilute propylene stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses a process further comprising separating a C4+ stream in a debutanizer zone to produce a C4 stream and a C5+ stream. See Column 2, lines 35-40. The reference discloses a process wherein the hydrocarbon feed is selected from the group consisting of ethane, propane, butanes, pentanes, naphtha, and mixtures thereof. See Column 1, lines 59-67 and Column 6, lines 49-55.

The reference does not disclose a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents. The reference does not disclose removing a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream. The reference does not disclose a process wherein the hydrocarbon feed consists essentially of C5 hydrocarbons.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents because the reference discloses steam cracking for gas streams with diverse constituents. It would have been obvious to one having ordinary skill in the art at the time the invention was made to remove a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream because this places the cracked gas stream in condition to be used for the production of an olefin stream. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the hydrocarbon feed consists essentially of C5 hydrocarbons because the reference discloses steam cracking for gas streams with diverse constituents.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Owen et al. (USPN 6,258,989).

The Owen reference discloses a process comprising treating said C5+ stream in a hydrotreating zone to produce a C5 diolefins stream, a BTX stream, and a DCPD stream. See Column 13, lines 30-36.

The reference does not disclose a process comprising treating said C5+ stream in a hydrotreating zone to produce a fuel oil stream.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to utilize a process comprising treating said C5+ stream in a hydrotreating zone to produce a C5 diolefins stream, a BTX stream, and a

DCPD stream and furthermore produce a fuel oil stream because both references disclose the upgrading of hydrocarbons and because fuel oil is a product of hydrotreating.

Claims 43-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Rao (WO 01/64340 A1).

The Rao reference discloses the formation of olefin derivatives from recovered olefins including ethylene and propylene. See Page 14, line 29. These derivatives include ethylbenzene, cumene, acrylic acid, and propylene oxide. See Page 15, lines 20-27.

The Rao reference does not disclose a dilute ethylene and propylene derivative unit.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to include the olefin derivates of Rao and the olefin derivative units because both references disclose processes of producing olefins and an olefin derivative unit is the means through which an olefin derivative is produced.

Claims 49-50 and 56-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533).

The Vebeliunas reference discloses steam cracking for gas streams with diverse constituents. See Column 1, lines 18-25. The reference discloses quenching, compressing, and deacidifying cracked gas streams. See Column 1, lines 59-67 and Column 6, lines 49-65. The reference discloses hydrogenating a portion of the acetylene in said cracked gas stream in a hydrogenation zone to produce a reduced acetylene cracked gas stream and separating said reduced acetylene cracked gas stream in a deethanizer zone to produce said dilute ethylene stream and a C3+ stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses separating said C3+ stream in a depropanizer zone to produce a C3- stream and a C4+

stream; and reacting a C3- stream in a MAPD reactor zone to convert a portion of methylacetylene and propadiene to propylene and propane to produce a dilute propylene stream. See Column 2, lines 20-67 and Column 3, lines 1-35. The reference discloses a process further comprising separating a C4+ stream in a debutanizer zone to produce a C4 stream and a C5+ stream. See Column 2, lines 35-40. The reference discloses a process wherein the hydrocarbon feed is selected from the group consisting of ethane, propane, butanes, pentanes, naphtha, and mixtures thereof. See Column 1, lines 59-67 and Column 6, lines 49-55.

The reference does not disclose a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents. The reference does not disclose removing a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream. The reference does not disclose a process wherein the hydrocarbon feed consists essentially of C5 hydrocarbons.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents because the reference discloses steam cracking for gas streams with diverse constituents. It would have been obvious to one having ordinary skill in the art at the time the invention was made to remove a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream because this places the cracked gas stream in condition to be used for the production of an olefin stream. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the

hydrocarbon feed consists essentially of C5 hydrocarbons because the reference discloses steam cracking for gas streams with diverse constituents.

Claims 51-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Rao (WO 01/64340 A1).

The Rao reference discloses the formation of olefin derivatives from recovered olefins including ethylene and propylene. See Page 14, line 29. These derivatives include ethylbenzene, cumene, acrylic acid, and propylene oxide. See Page 15, lines 20-27.

The Rao reference does not disclose a dilute ethylene and propylene derivative unit.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to include the olefin derivates of Rao and the olefin derivative units because both references disclose processes of producing olefins and an olefin derivative unit is the means through which an olefin derivative is produced.

Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Owen et al. (USPN 6,258,989).

The Owen reference discloses a process comprising treating said C5+ stream in a hydrotreating zone to produce a C5 diolefins stream, a BTX stream, and a DCPD stream. See Column 13, lines 30-36.

The reference does not disclose a process comprising treating said C5+ stream in a hydrotreating zone to produce a fuel oil stream.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to utilize a process comprising treating said C5+ stream in a hydrotreating zone to produce a C5 diolefins stream, a BTX stream, and a

DCPD stream and furthermore produce a fuel oil stream because both references disclose the upgrading of hydrocarbons and because fuel oil is a product of hydrotreating.

Claims 59-60, 62-63, 65-66, 68-69, 71-72, and 74-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Rao (WO 01/64340 A1).

The Rao reference discloses the formation of olefin derivatives from recovered olefins including ethylene and propylene. See Page 14, line 29. These derivatives include ethylbenzene, cumene, acrylic acid, and propylene oxide. See Page 15, lines 20-27.

The Rao reference does not disclose a dilute ethylene and propylene derivative unit.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to include the olefin derivates of Rao and the olefin derivative units because both references disclose processes of producing olefins and an olefin derivative unit is the means through which an olefin derivative is produced.

Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533).

The Vebeliunas reference discloses steam cracking for gas streams with diverse constituents. See Column 1, lines 18-25. The reference discloses quenching, compressing, and deacidifying cracked gas streams. See Column 1, lines 59-67 and Column 6, lines 49-65. The reference discloses a process wherein the hydrocarbon feed is selected from the group consisting of ethane, propane, butanes, pentanes, naphtha, and mixtures thereof. See Column 1, lines 59-67 and Column 6, lines 49-55. The reference discloses separating said cracked gas stream in a deethanizer zone to produce a C2- stream and a C3+ stream; compressing said C2- stream in a

second compression zone to form a pressurized C2- stream; and hydrogenating said pressurized C2- stream in a hydrogenation zone to remove a portion of the acetylene to produce said dilute ethylene stream; and routing said C3+ stream to storage or other process unit. See Column 2, lines 20-67; Column 3, lines 1-35; Column 3, lines 64-68; and Column 4, lines 1-2 and lines 42-56.

The reference does not disclose a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents. The reference does not disclose removing a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents because the reference discloses steam cracking for gas streams with diverse constituents. It would have been obvious to one having ordinary skill in the art at the time the invention was made to remove a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream because this places the cracked gas stream in condition to be used for the production of an olefin stream.

Claims 70 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533).

The Vebeliunas reference discloses steam cracking for gas streams with diverse constituents. See Column 1, lines 18-25. The reference discloses quenching, compressing, and deacidifying cracked gas streams. See Column 1, lines 59-67 and Column 6, lines 49-65. The

reference discloses a process wherein the hydrocarbon feed is selected from the group consisting of ethane, propane, butanes, pentanes, naphtha, and mixtures thereof. See Column 1, lines 59-67 and Column 6, lines 49-55. The reference discloses separating said cracked gas stream in a deethanizer zone to produce a C2- stream and a C3+ stream; and hydrogenating said pressurized C2- stream in a hydrogenation zone to remove a portion of the acetylene to produce said dilute ethylene stream; and routing said C3+ stream to storage or other process unit. See Column 2, lines 20-67; Column 3, lines 1-35; Column 3, lines 64-68; and Column 4, lines 1-2 and lines 42-56.

The reference does not disclose a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents. The reference does not disclose removing a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the raw cracked gas stream comprises hydrogen, methane, C2 hydrocarbons, C3 hydrocarbons and heavier constituents because the reference discloses steam cracking for gas streams with diverse constituents. It would have been obvious to one having ordinary skill in the art at the time the invention was made to remove a portion of the hydrogen sulfide to form a wet cracked gas stream and drying said wet cracked gas stream in a drying zone to form a cracked gas stream because this places the cracked gas stream in condition to be used for the production of an olefin stream.

Claim 83 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of Hart (USPN 6,290,876).

Vebeliunas does not disclose a process for producing a propylene oxide stream comprising the following steps: (1) reacting said dilute ethylene with benzene in an ethylbenzene reactor zone to form an ethylbenzene stream; (2) oxidizing said ethylbenzene stream with air in an EB oxidation zone to form a EBHP stream; (3) reacting said EBHP stream with a dilute propylene stream in a propylene epoxidation zone to form an impure propylene oxide stream; (4) separating said impure propylene oxide stream in a product separator zone to form a raw propylene oxide stream, a MBA/ACP stream, a tail gas stream, and a residue stream; (5) separating said raw propylene oxide stream in a propylene oxide separation zone to form an impurities stream and said propylene oxide stream; (6) and reacting said MBA/ ACP stream in a styrene production and separation zone to form a styrene stream, fuel stream, and a wastewater stream.

The Hart reference discloses oxidizing ethylbenzene with molecular oxygen to produce ethylbenzene hydroperoxide. See Column 1, lines 20-40. The reference discloses reacting the ethylbenzene hydroperoxide stream with a propylene stream to produce propylene oxide and methylbenzyl alcohol. See Column 1, lines 20-40. The reference discloses the dehydration of methylbenzyl alcohol to form styrene. Column 1, lines 30-35

It would have been obvious to one having ordinary skill in the art at the time the invention was made to react ethylene with benzene to form ethylbenzene because ethylbenzene may be utilized to create other useful chemical compounds. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to utilize Hart's oxidation of ethylbenzene with molecular oxygen to produce ethylbenzene hydroperoxide or to utilize air because oxygen is a component of air and because

ethylbenzene hydroperoxide is useful in the formation of propylene oxide. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to utilize Hart's reacting of ethylbenzene hydroperoxide stream with a propylene stream to produce propylene oxide and methylbenzyl alcohol because methylbenzyl alcohol is useful for the formation of styrenes. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to utilize Hart's dehydration of methylbenzyl alcohol to form styrene because styrenes are useful in organic synthesis. It would have been obvious to one having ordinary skill in the art at the time the invention was made to separate said impure propylene oxide stream in a product separator zone to form a raw propylene oxide stream, a MBA/ACP stream, a tail gas stream, and a residue stream; separate said raw propylene oxide stream in a propylene oxide separation zone to form an impurities stream and said propylene oxide stream; and separate said MBA/ ACP stream in a styrene production and separation zone to form a styrene stream, fuel stream, and a wastewater stream because separation of streams into useful products allows for ease of use of products.

Claim 84 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of George A. Olah, Hydrocarbon Chemistry, 1995.

Vebeliunas does not disclose oxidizing said dilute propylene stream in a oxidation reactor zone to form an aqueous acrylic acid stream and a vent gas stream. The reference does not disclose separating said aqueous acrylic acid stream in a recovery and purification zone to form said acrylic acid stream and a mixed acid/ester waste stream.

The Olah reference discloses the oxidation of propylene to form acrylic acid. See Pages 371-372.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to utilize Olah's oxidation of propylene to form acrylic acid and to utilize a process of oxidizing said dilute propylene stream in a oxidation reactor zone to form an aqueous acrylic acid stream and a vent gas stream and separating said aqueous acrylic acid stream in a recovery and purification zone to form said acrylic acid stream and a mixed acid/ester waste stream because acrylic acid is useful in producing products such as coatings and adhesives and because separation of streams into useful products allows for ease of use of products.

Claim 85 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of George A. Olah, Hydrocarbon Chemistry, 1995.

The Vebeliunas reference does not disclose reacting a dilute propylene stream and a benzene feed stream in a dilute propylene alkylation zone to produce a raw cumene stream; separating said raw cumene stream in a cumene separations zone to form a benzene stream, a heavies stream, said cumene stream, a dipropyl benzene stream, and a propane stream; transalkylating said benzene stream and dipropyl benzene stream in a transalkylation zone to form a transalkylated cumene stream; separating said transalkylated cumene-rich stream in said cumene separations zone to produce said cumene stream, said propane stream, said heavies stream, and said benzene stream; and optionally, recycling a portion of said benzene stream to said dilute propylene alkylation zone.

The Olah reference discloses the manufacture of cumene by the alkylation of benzene with propylene. See Page 186. The reference discloses transalkylating said benzene stream and dipropyl benzene stream in a transalkylation zone to form a transalkylated cumene rich stream. See Page 186.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to include Olah's manufacture of cumene by the alkylation of benzene with propylene and transalkylating said benzene stream and dipropyl benzene stream in a transalkylation zone to form a transalkylated cumene rich stream because cumene is useful in the production of phenol and acetone. It would have been obvious to one having ordinary skill in the art at the time the invention was made to separate said raw cumene stream in a cumene separations zone to form a benzene stream, a heavies stream, said cumene stream, a dipropyl benzene stream, and a propane stream and to separate said transalkylated cumene-rich stream in said cumene separations zone to produce said cumene stream, said propane stream, said heavies stream, and said benzene stream because separation of streams into useful products allows for ease of use of products. It would have been obvious to one having ordinary skill in the art at the time the invention was made to recycle a portion of said benzene stream to said dilute propylene alkylation zone because the recycled benzene can be used to produce more cumene.

Claim 86 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vebeliunas et al. (USPN 6,107,533) in view of George A. Olah, Hydrocarbon Chemistry, 1995.

The Vebeliunas reference does not disclose reacting a dilute ethylene stream and a benzene stream in an alkylation reactor zone to form an ethylbenzene rich stream; separating said

ethylbenzene rich stream in an ethylbenzene separation zone to form a separations benzene recycle stream, a separations tail gas stream, a diethylbenzene and polyethylbenzene stream, and an ethylbenzene stream; reacting said separations benzene recycle stream in an ethylbenzene transalkylation reactor zone to produce said ethylbenzene rich stream; and optionally, recycling a portion of said separations benzene recycle stream to said dilute propylene alkylation reactor zone.

The Olah reference discloses reacting benzene with ethylene in an alkylation reactor zone to form ethylbenzene. See Page 167.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Vebeliunas to include Olah's reaction of benzene with ethylene in an alkylation reactor zone to form ethylbenzene because ethylbenzene is useful in the formation of styrene. It would have been obvious to one having ordinary skill in the art at the time the invention was made to separate said ethylbenzene rich stream in an ethylbenzene separation zone to form a separations benzene recycle stream, a separations tail gas stream, a diethylbenzene and polyethylbenzene stream, and a ethylbenzene stream; reacting said separations benzene recycle stream in an ethylbenzene transalkylation reactor zone to produce said ethylbenzene rich stream; and optionally, recycling a portion of said separations benzene recycle stream to said dilute propylene alkylation reactor zone because separation of streams into useful products allows for ease of use of products and because the recycled benzene can be used to produce more ethylbenzene.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Arnold, Jr. whose telephone number is 703-305-5308. The examiner can normally be reached on Monday-Thursday 8:30 AM-6:00 PM; Fridays from 8;30 AM-5:00 PM with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0651.

Walter D. Griffin
Primary Examiner